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ABSTRACT

The three main approaches to educational planning are social demand, manpower forecasting, and cost benefit. The social demand approach, useful only for reference purposes, attempts to forecast and assess consumer demand for education. Manpower forecasting tries to insure an output of the educational system to meet future economic demands, but provides mere approximations for medium-and shortrun goals. The cost-benefit approach, which will be most utilized in the future, attempts to insure either maximization of some objective function, or minimization of resources used to achieve a certain goal. Although sometimes inaccurate, ratios are essential to this approach. These three approaches will be used until replaced by more reliable tools, but in the final analysis the decision-making function for educational resource allocation will remain political. (Author/LLR)

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THREE APPROACHES TO EDUCATIONAL  
RESOURCE ALLOCATION

by

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### SUMMARY

The purpose of this paper is to provide a critical survey of the three main approaches to educational planning problems: the social demand approach, the manpower forecasting approach, and the cost benefit approach. The social demand approach acts as a social barometer and tries to assess consumer demands for education. The manpower forecasting approach attempts to ensure that the educational system will produce a mix of manpower in keeping with future economic demands. The cost benefit approach tries to ensure either that fixed resources will be allocated so as to maximize an objective function, or that a fixed project will be implemented with a minimum of resources.

Although a proper combination of the three methods may constitute a useful planning strategy, each has its own peculiar drawbacks. The social demand approach has as its final product a demand which can never be satisfied and is only useful for reference purposes. Despite its expected improvement through the future introduction of comprehensive data banks, the manpower forecasting method still only provides approximate figures for medium and short term targets. The cost benefit approach, on the other hand, produces ratios which may be grossly inaccurate, but since each ratio may be subject to the same biases its results may still be useful.

The future will probably see a more extensive utilization of the cost benefit approach to problems of educational expenditure, as well as the development of new techniques of marginal analysis.

In the final analysis, education is the hand-maiden of politics, and no matter how powerful the methodology becomes, the decision making function will remain a political one. Thus, these three tools will be used until better, more reliable approaches are developed to replace them. But these too, will only be tools.

## INTRODUCTION

Over the past two decades, it has become apparent that education, or more particularly, the level of educational attainment of a nation's stock of manpower, is quite closely correlated with that nation's economic growth. At first glance, this is not surprising, since education has a direct effect upon both the quantity and quality of occupational skills within the labour force, and several indirect effects, in the form of increased initiative and inventiveness, within the individual workers. This somewhat obvious relationship came to light, when the United States was experiencing a decreasing capital to labour ratio on the one hand, and an increasing rate of growth on the other, baffling contemporary economic thought. T.W. Schultz was able to rationalize this apparent paradox quite easily, by asserting that some capital, namely 'human capital', was not being taken into consideration.<sup>1/</sup> As Phillips expressed it:

'The role of education as an item of consumption and the fact that it is treated as a social item in national accounting has obscured the part it plays as an economic investment.' 2/

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1. Schultz, T.W., "Investment in Human Capital", in American Economic Review, March 1961, p.1-17.
  2. Phillips, H.M., "Education and Development" in Economic and Social Aspects of Educational Planning. UNESCO, 1964, p.19.

Accordingly, many empirical studies were undertaken in an attempt to more closely quantify the connection between education and economic growth. For example, Denison was able to show that twenty per cent of the growth of the American Economy from 1929 to 1957 could be attributed to 'the advance of knowledge'.<sup>3/</sup> In another study, Gary Becker showed that the rate of return on human capital investment (i.e. expenditure on college education) much exceeded the rate of return on investments in the private sector of the economy, and hence established that there is a large under-investment in American College Education.<sup>4/</sup>

The recognition of education as a major contributor to economic development having been thoroughly disseminated, nations began to allocate increasing shares of their local, provincial, and federal taxation revenues to the field of education in order to further stimulate economic expansion. The 1968 Ontario budget, for example, is over forty per cent earmarked for educational purposes. Concurrently, much attention was turned to the task of ensuring that the scarce resources available for the educational superstructure's needs be utilized as efficiently as possible. The need for immediate amelioration

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3. Denison, E.F., The Sources of Economic Growth in the United States and the Alternatives Before Us. Committee for Economic Development, Supplementary Paper No.13, New York: CED, 1962.
  4. Becker, G.S., "Underinvestment in College Education", in American Economic Review. May, 1960, p.346-354, 375-378.

of an environment in which oft-times ambivalent administrators make haphazard politically tainted decisions was recognized by Galbraith:

'A society which sets as its highest goal the production of private consumer goods will continue to reflect such attitudes in all its public decisions ..... Education, no less than National Defense or foreign assistance, is in the public domain. It is subject to the impediments to resource allocation between private and public use. So once again, our survival, security, and contentment returns us to the problem of guiding resources to the most urgent ends.' 5/

In order to cope with this acute problem of resource allocation, a field of investigation known as 'educational planning' evolved. This is not to suggest that a planning function has been absent from the educational system until quite recently, although such a thought may often be justified. It is a fact that in the centrally planned Soviet Union, detailed educational-planning, as a particular aspect of integrated economic planning, has been carried on for well over forty years.<sup>6/</sup> The educational planning referred to here represents a recent addition to the realm of knowledge, which many economists and educators are looking to as a panacea for their planning nightmares. A pleasant sounding, all-embracing definition of educational planning is as follows:

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5. Galbraith, J.K., The Affluent Society. Boston: Houghton-Mifflin, 1958, p.352-355.

6. Phillips, H.M., op.cit.

They are known as the 'social demand' approach to educational planning, the 'manpower forecasting' approach to educational planning, and the 'cost-benefit' approach to educational planning.

I propose, first of all, to present some preliminary ideas concerning educational criteria, necessary to put each of these three approaches into the context of the objectives which they purport to serve. Secondly, I will systematically present a description and a critical appraisal of each of the three planning methods.

EDUCATION AND EDUCATIONAL CRITERIA

The best place to begin our investigation is with an analysis of education itself. When we speak of education, we are referring to that characteristic which Schultz labels, 'schooling', meaning those activities which constitute the integral part of learning, as distinct from what he calls, 'education', meaning various peripheral functions of the 'educational institution' such as research and teacher training.<sup>9/</sup>

Education leads two lives. It can be separated into the two components of investment and consumption. There is no immediate difficulty in making this distinction on a theoretical plane. Schultz supplies us with the following criterion:

'where schooling increases future earnings of students, it is an investment ..... (since) only if schooling increases future productivity and earnings do the contributions of schooling become a source of measured economic growth.' 10/

But to arrive at a separation on an empirical basis is quite another problem. According to Bowman:

'The most important set of problems is the sorting out of investment in human producer capital versus immediate consumption, and more important, investment in human consumer capital.' 11/

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9. Schultz, T.W., The Economic Value of Education. New York: Columbia University Press, 1963, p.8

10. Ibid., p.10 and p.39

11. Bowman, M.J., "Human Capital: Concepts and Measures", in Economics of Higher Education, ed. by Mushkin, S.J. Washington D.C.: Government Printing Office, 1962, p.78

Even Schultz must pay his obeisance to this impasse:

'with this difficulty, any allocation based on clues as seem relevant, must in all honesty be labelled arbitrary.'<sup>12/</sup>

We know that some of education must be an investment, and some consumption, but, neither do we know the proportions now, nor do we ever expect to do more than approximate them in the future. As will be seen later, this inability to differentiate between the dichotomous roles of education the consumer, and education the investor, causes much difficulty in cost-benefit calculations.

This problem becomes even more acute when we consider, as Bowman suggests in her previous comment, that some portion of the consumer values of education represent investments of a kind. An example of this would be the ability to enjoy future leisure time through the acquired facility of reading, which was learned at school.

Leaving aside questions about the nature of education, I would like to pass on to an analysis of the goals of educational systems. Research into education is not meaningful unless it is done with reference to the objectives of the particular system. The ultimate aim of studying resource allocation in the field of education is optimization, and this presupposes the existence of an objective function. Hence, it is prudent in the field of

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12. Schultz, T.W., The Economic Value of Education. New York: Columbia University Press, 1963, p.55

education, as with any other 'business', to periodically examine the expected convergence of plans with organizational goals.

Broadly speaking, there are three types of criteria: those which serve the individual; those which serve the state; and those which serve the institution. I should like to look at educational criteria, broken down into the following five categories: quality criteria, political criteria, institutional criteria, equity criteria, and efficiency criteria, the latter two groups having been suggested by Anderson and Bowman.<sup>13/</sup>

All systems of education should be concerned with the quality of their output product. Several quality control mechanisms have been built into the traditional school structure to ensure a minimum standard. These take the form of entrance requirement regulations, specification of curricula, and examinations. These quality criteria are in the interests of the state, and occasionally the institution, although all too often, they are cited in an effort to mask the fact that an institution has not provided enough places for students.

Institutional criteria appear in the private school system, and in higher education, where institutions are not wholly state supported. These may take the form of preserving well

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13. Anderson, C.A., and Bowman, M.J., "Theoretical Considerations in Educational Planning", in The World Year Book of Education - 1967, ed. by Bereday, G.Z.F., and Lauwerys, J.A., New York: Harcourt, Brace and World, 1967, p.17-20.

established traditions, or of enhancing the prestige of such institutions. Included in this category are prevalent references to producing "good citizens" or "morally upright adults".

Political criteria appear as decrees created by fiat and imposed on the education framework for the purposes of political expediency. They may be implemented to live up to campaign promises, or perhaps to relieve future scarcity in some crucial job category.

While these first three sets of criteria are important, we will confine our detailed study to the set of equity criteria, and the set of efficiency criteria, as some workable resolution of these two must be made in order to serve democracy's 'universal human right' of equality of educational opportunity.<sup>14/</sup>

One example of an equity objective is to give an equal amount of education to everyone. Such a criterion is not practical and hence is never imposed, although all other equity criteria are restricted applications of this one. Another equity criterion is to provide schooling in a sufficient quantity so as to bring each child up to some set minimum standard. Such an aim is very common in both primary and secondary school systems, where education is 'compulsory' up to some minimum age or grade. A further equity criterion is to provide education sufficient to bring everyone up to his potential, potential being

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14. Ibid., p.17

defined as the point where marginal returns to education for a particular individual are no longer positive. This is the ultimate goal of all democratic educational systems. In practice, however, no country can afford the expense of fully implementing such a criterion, and so often, the lines along which each person may develop his potential are limited by the state. A final equity criterion is to provide continued opportunities for schooling as long as gains in learning per unit input of teaching match some agreed norm. This criterion is an integral part of all educational policies, and represents a powerful tool of the state because of its two-sided implications. If the places do not exist to allow each person to develop to the limit of his potential, the examination standards implicit in this criterion can be raised accordingly.

A first efficiency criterion is to provide education based on how much additional learning can be predicted for one student with respect to every other person. This criterion applies particularly at institutions of higher learning to achieve some measure of efficiency. Since demand for places exceeds supply, students with the highest entrance qualifications will be given priority. A second efficiency criterion is to give priority to certain groups of students, or to students in particular localities. This criterion is closely akin to the political objectives mentioned earlier, although the motivation is socio-economic in nature, rather than political. A third efficiency criterion is to invest in those branches of education

where the ratios of benefits to costs are highest, continuing to invest as long as they remain higher than alternative usage ratios. This criterion, purely economic in nature, accepts the status quo and tries to make the best of what resources are available. As will be seen later, this lies at the very heart of the cost-benefit approach.

These, then, are the most common of the criteria which educational systems purport to serve. The so-called equity criteria emphasize the sovereignty of the individual, to the complete exclusion of state preferences. The efficiency criteria, however, are on the opposite extremity of the continuum. The social demand approach to educational planning serves equity criteria, while both the manpower forecasting and cost-benefit approaches serve efficiency ones.

Before commencing to study each of these three approaches in detail, it must be noted that no one approach is broad enough to satisfy the requirements of the educational criteria of any nation. The final mix of methodology selected, which may contain techniques other than these three, will depend on the specific circumstances a nation perceives itself to be in. It is imperative, though, that planning heed the following remark:

'there is urgent need for careful educational planning which will maintain a viable balance among all major fields of knowledge, among all the major objects of education, among all types of creative manpower, and a balance between the needs of the individual and the needs of the state.' 15/

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15. Coombs, P.H., "Educational Planning in the Light of Economic Requirements", in Forecasting Manpower Needs for the Age of Science. Paris: OEEC, 1960, p.26

THE SOCIAL DEMAND APPROACH

Basically, the social demand approach attempts to forecast the 'consumer' demand for education at various future times. The components of this demand function are many, but evidence has shown that some of the main ones are the size of the school age population, per capita income, and the distribution of the population by 'intellectual capacity'.<sup>16/</sup> The first step in this approach is to forecast the age distribution of the population of 'school age' members, for a variety of future dates. This naturally involves some type of extrapolation of birth, mortality, and net migration data.

Secondly, the demand for places at each grade of the educational system is computed for each such future date, using an appropriate level of disaggregation. This is a simple task for the 'compulsory' stage of the system, amounting to an extrapolation of the trends in transition proportions for these relevant grades. Beyond this stage, demand schedules are drawn up as best as possible, by considering the components of demand mentioned earlier, in addition to the observed transition proportion changes. Once the predicted transition proportions are obtained, they are applied to the estimated population figures to obtain the 'social demand' for education.

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16. Correa, H., The Economics of Human Resources. Amsterdam: North-Holland Publishing Co., 1963.

As a preliminary comment on this approach, Phillips' remarks seem appropriate:

'The first approach, which may be called the social method, is that in general use, but is scarcely a method at all, and is a starting point from which improvements must be devised'. 17/

Once planners in government are in possession of such demands for education, they are powerless to provide complete satiation. As G. Skorov summed up the situation:

'It is hoped that the educational system will be expanded enough to allow any member of society willing to do so to receive higher education, is not very far ahead. However, no centrally planned economy, in fact no society in the world, can afford it'. 18/

Even if nations were able to finance such a scheme, they might well emerge with a large stockpile of 'unemployed intellectuals' and jeopardized positions in world markets. Certainly the state should have some small say in the menu of courses that is to be made available to potential students.

Thus, once the social demand forecasts have been made, a great deal remains to be done. This approach has, at best, generated demand curves for places in every grade of each type of institution, depending on the amount of disaggregation.

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17. Phillips, H.M., op.cit., p.27

18. Skorov, G., "The Manpower Approach to Educational Planning" in Economic and Social Aspects of Education Planning. UNESCO, 1964. p.132

Political authorities still have to specify an appropriate assortment of supply schedules, using techniques unrelated to the social demand approach. It is one problem to estimate consumer demand for education. It is quite another to effect a compromise on the supply side.

I do not mean to imply that the social demand approach is of no utility whatsoever. The fact that it recognizes the importance of consumer preferences for education, and sees education as both a developmental process as well as an end in itself, is enough justification for its existence. Furthermore, the forecasted demands for places in the compulsory stage of the school system provide planners with adequate lead times for the provision of required facilities and staff in the future. Whatever other methods are used in planning educational needs, the social demand approach should definitely be used to supplement other results.

Much more could be written about this approach, but because it is of such limited use, providing only a measure of what 'society should do', it will be passed over quite quickly. Instead, we shall spend more time concentrating on the manpower forecasting and cost-benefit approaches, both dealing with efficiency, since therein lie the most pressing problems of educational planning. As Phillips says:

'Since the contribution of education to occupational needs is the predominant part of its economic value, the manpower approach is clearly an indispensable link in the chain.' 19/

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19. Phillips, H.M., op.cit. p.29

THE MANPOWER FORECASTING APPROACH

Those tools which fall under the rubric of manpower forecasting are nothing more than mathematical models, widely divergent in structural makeup, but possessing the common goal of forecasting the economy's demands for educated manpower at a variety of dates in the future. Simply stated, the manpower forecasting approach can be separated into four steps. First of all, output targets for each sector of the nation's economy are established for a variety of dates in the future. This is usually done by extrapolating current economic trends. Secondly, a mapping is produced that can translate these output targets into the aggregate number of workers required to achieve these results, at each such future date. Thirdly, a disaggregation is performed, subdividing total manpower into demands by occupational classification. And lastly, these occupational demands are transformed into educational outputs, and concurrently, educational inputs, by taking account of the minimum required amount of training for each such classification, and appropriate population contingencies.<sup>20/</sup>

The socio-economic and political conditions under which forecasting is to be performed have to be built into the model before it can be used. In general, the greater the number of

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20. Bereday, G.Z.F., and Lauwerys, J.A., "Section III: The Manpower-Requirements Approach", in The World Year Book of Education, 1967. New York: Harcourt, Brace & World, 1967, p.135-136.

constraints involved, the more unwieldy the tool becomes from a computational point of view. Thus, in order to retain practicality, the process of model disaggregation must be terminated at some finite stage. An advantage to building a general as opposed to a specific model, is that major structural changes can usually be implemented with a minimum of effort. Hector Correa, for example, is able to alter his forecasting model, to accommodate consumer educational demands, with a modicum of trouble.<sup>21/</sup>

Manpower forecasting is by no means a recent innovation in the field of educational research. Though widely implemented throughout the countries of the world, democratic and communistic alike, manpower forecasting continues to evoke widely contrasting opinions as to its utility. A typical feeling for the 'ayes' is:

'.....so meeting the manpower requirements emerges as the major and primary task of the educational system.'<sup>22/</sup>

On the other hand, a vote for the 'noes' is aired by the following:

'Let me begin by saying that I find the whole manpower concept repulsive, disgusting, dangerous, fascistic, communistic, incompatible with the ideals of liberal democracy, and unsuitable company for the minds of the young.'<sup>23/</sup>

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21. Correa, H., op.cit.

22. Skorov, G., op.cit., p.132

23. Boulding, K.E., "An Economist's View of the Manpower Concept" in Proceedings of a Conference on the Utilization of Scientific and Professional Manpower, Oct.7-11, 1953. ed.by National Manpower Council. New York: Columbia University Press, 1954, p.11

At first blush, these seemingly innocent tools are clothed in a thick veil of controversy. It is expedient, therefore, to examine the more predominant attributes of the manpower forecasting method.

When initially confronted with the vehemence expressed by K.E. Boulding in the previous quotation, the reader might tend to banish manpower forecasting from the vocabulary of democracy, restricting its usage solely to the totalitarian spheres of government. He continues his argument with:

'In a free society, man is not  
manpower.....he is a free being.'<sup>24/</sup>

Boulding apparently feels that in a democracy, the market mechanism and the ruling of its "invisible hand" could operate efficiently enough to preclude the necessity of state involvement in education, complete with its manpower forecasting methods.

While conceding that Boulding's idealistic appeal has much merit, its practical imperfections notwithstanding, we cannot dispute the success which socialistic manpower forecasting enjoys. We need look no further than the following objective of the educational system of the Soviet Union to find a rational explanation:

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24. Boulding, K.E., op.cit., p.12

'To train highly qualified specialists educated in the spirit of Marxism-Leninism, well-versed in both the latest achievements of science and technology, at home and abroad, and in the practical aspects of production, capable of utilizing modern technology to the utmost and of creating the technology of the future.'<sup>25/</sup>

Conspicuous by their absence are any references among national educational goals to the recognition of consumer aspects of education among the centrally planned communistic societies. Thus manpower forecasting has a free hand in the planning of education.

But surely, the promises of this approach to democratically governed nations must justify some type of modification to circumvent moral objections claiming a threat to freedom. Indeed, even among the free nations, overall educational objectives may coincide with economic ones, as expressed in the following comment on the Mediterranean Regional Project, an educational plan applied to relatively underdeveloped countries:

'.... one of the distinctive features of the Mediterranean Regional Project studies is the careful and systematic attention given to the relationship between the educational system and the economy's future needs for trained manpower.'<sup>26/</sup>

The usual modification of the manpower forecasting philosophy is to substitute inducement for coercion, and hence fall into line

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25. Grant, N., Soviet Education. Harmondsworth, England: Penguin Books, 1964, p.110.

26. Parnes, H.S., "The O.E.C.D. Mediterranean Regional Project in Retrospect", in The World Year Book of Education - 1967, ed by Bereday, G.Z.F., and Lauwerys, J.A., New York: Harcourt, Brace & World, 1967, p.157.

with the traditional "American Way". Phillips expressed this as follows:

'The preferences of parents and pupils in the end govern entry into the available types of education.....But it is necessary to provide incentives and ladders to lead pupils into priority occupations for the attainment of the development plan.' 27/

All subtlety is abandoned, and recruitment to fulfill the forecasted manpower requirements is assisted by progressive vocational guidance programs, theme advertising, increased enrolment facilities in appropriate faculties, increased financial assistance to interested students, and finally, increased salaries in the market place. Though it might appear that these persuasive factors are more than adequate to cope with the phenomenon of divergent consumer choice, such does not seem to be the experience of manpower forecasting attempts in free countries. To quote Mr. S.O. Das:

'Apart from capacity problems, there is another difficulty.....Occupational and educational preferences of the juveniles may often form patterns and trends that can be influenced only slowly, inaccurately, and within certain limits.' 28/

Returning to the moral question itself, we must conclude, in light of these facts, that any objection to manpower forecasting on purely ethical grounds can not be justified.

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27. Phillips, H.M. op.cit., p.20

28. Das, S.O. "Long Term Employment Forecasting - Some Problems with Special Reference to Current Organization and Methods in Sweden", in Employment Forecasting. O.E.C.D. 1962, p.28.

The apparent conflict with freedom is best resolved by the formerly antagonistic Mr. Boulding, who finally retreats to this position:

'Men go into occupations which they would not otherwise have entered because it has been made advantageous for them to do so through the financial power of the state, not because they have been forced unwillingly into these occupations by the threat of police power'. 29/

The objection most frequently hurled at the utility of the manpower forecasting approach is that any requirements predicted for more than five years into the future are bound to be at best, arbitrary, and at worst, totally unrealistic. The force exerting the most pressure upon economists to reject the assumption of constant input-output coefficients in the manpower approach is 'technological progress'. John Vaizey explains this uncertainty in the following manner:

'In the long run, the problem is primarily one of forecasting the direction and pace of technological change. An intellectual impasse is reached; we have to guess what changes in knowledge itself will do to change the future.' 30/

Can we then concentrate only on short term forecasting? Unfortunately, short term manpower requirements are meaningless, when we bear in mind the long lead time required by the educational system to train the necessary men.

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29. Boulding, K.E., op.cit. p.20

30. Vaizey, J., The Economics of Education. London: Faber & Faber, 1963, p.91

This is not to suggest that manpower forecasting is hopelessly futile. It is meant, however, to suggest that this approach does have serious drawbacks as far as accuracy is concerned, and, moreover, that manpower forecasting should be used as a supplement to, rather than a substitute for other planning techniques in the formulation of future economic plans.

Even the centrally planned economies have no mystical way of overcoming this time horizon limitation of the manpower method, as can be seen from the following translation of a remark by Krushchev:

'We do not have any scientifically reliable method of estimating how many and what kind of specialists we need in different branches of the national economy, what the future demand will be for a certain kind of specialist, and when such a demand will arise.' 31/

The problem of a long time horizon, while rendering the forecasts of most static models somewhat meaningless, can be partially solved by incorporating some type of 'feedback' mechanism into a dynamic forecasting structure. Such a model would adjust its own forecasts on the basis of the most recent actual experience. Though many setbacks would be encountered initially, such a technique would be useful once a broad base of historical data could be established.

A logical extension to such a model would be to supplement it with risk function models, which could measure the relative losses expected to accrue, should the manpower forecasts

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31. DeWitt, N., "Educational and Manpower Planning in the Soviet Union", in The World Year Book of Education - 1967, ed. by Bereday, G.Z.F., and Lauwerys, J.A. New York: Harcourt, Brace & World, 1967, p.230

turn out to be inaccurate. By using such tools, an approximation to optimality could be achieved, optimal in the sense that the final forecasted requirements selected would be those bearing minimal risk.

Uncertainty of change in technology is not the only deterrent to successful manpower forecasting. Shifts in the social demand for various classifications of manpower probably exert a more damaging influence upon the effectiveness of such forecasting than the unpredictable whims of technological progress and automation. Commenting on current deficiencies in economic planning and their effect upon the unemployment situation, Daniere suggested:

'Thus, while we may be detecting signs of chronic unemployment, these do not reflect the fatal progress of automation, but rather the chronic failure of our system to discern the tasks ahead.' 32/

Here we are, face to face with the plague of specialization. Manpower models assume that the elasticity of demand for skills is zero, and hence hold that nothing can be done if predicted manpower requirements turn out to be inaccurate. But we must establish how readily manpower can be channelled from one occupational category to another within the economy, in order to fill actual future needs with the supplies produced to meet expected future needs. It is one problem to have manpower

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32. Daniere, A., Higher Education in the American Economy. Harvard: Cambridge, 1964, p.11

deficiencies within the nation. It is quite another to emerge with a surplus of 'unemployable intellectuals', owing to the inability to substitute one skill for another indiscriminately.

There are several grounds on which this danger of overproduction of certain types of manpower can be dismissed. The first concerns the notion that derived demand will arise sufficient to liquidate surplus stocks of manpower, as described by Schmidt:

'Without any doubt the situation is that needs are created through an increased supply; an increased supply of highly qualified engineers and technical leaders will in itself provide a major impetus for development - and thus generate new needs for technical and scientific personnel.' 33/

Secondly, a nation can hide this danger behind a cloak of false security and successfully finesse it altogether. The 'Robbins Committee' uncovered a fine example of this technique, while going about their task of forecasting future enrolments for higher education in Britain. During the course of their investigations, a visit was made to the U.S.S.R., where the question of forecasting accuracy didn't seem to matter:

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33. Schmidt, E.J., "Economic Growth and the Manpower Factor" in Forecasting Manpower Needs for the Age of Science. Paris: OEEC, 1960, p.17

'When we indicated our difficulties in understanding how, with all the uncertainties as regards invention and the advancement of knowledge generally, reliance could be placed on statistics of requirements for more than a very few years ahead, we were met with the reply that in the Soviet Union, there would always be use for people who had been trained to the limit of their potential ability.' 34/

Allowance for skill substitutability is not made in most manpower forecasting models, partially because it would render them extremely cumbersome when carried into great detail, and partially because empirical evidence on such substitutions is, to all intents and purposes, non-existent. A feasible way of eliminating the need to estimate such figures is to restrict models to a minimal amount of disaggregation. But such a policy would defeat the major purpose of manpower forecasting, which is to obtain requirements for such local sector of the economy, as well as global requirements.

Perhaps the overall problem of skill substitution is not as severe as we might think. We must concede that substitution cannot be made for professional specialists such as doctors, dentists, and pharmacists, and hence, meeting forecasted requirements for such occupations is crucial, although

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34. Floud, J., "The Robbins Report and the Reform of Higher Education in Britain" in The World Year Book of Education - 1967 ed. by Bereday, G.Z.F., and Lauwerys, J.A., New York: Harcourt, Brace & World, 1967, p.91.

overproduction would probably not be too acute. But beyond that, standards of accuracy for other occupations are not nearly as stringent. If a serious shortage of engineers appeared in the future, less scarce resources, be they mathematicians or scientists generally, could alleviate the deficiency. Steps within the educational system could be taken to ameliorate such conditions, if the public authorities accepted the decree of W.D. Halls:

'Thus education must aim at  
inculcating adaptability in  
the educated.' 35/

Clearly, the more men that are trained to be adaptable to transfer from one occupation to another, the less need there will be for detailed manpower forecasting techniques.

As was mentioned earlier, the manpower forecasting approach is held in some disrepute because of its purely economic motives. Insofar as the 'democratic' countries are concerned, nations which are so 'right wing' as to stress efficiency criteria to the complete exclusion of equity criteria cannot be found.

Some nations do, however, place much weight upon economic expansion, and this is reflected by the use of manpower techniques within the educational system. Such nations are prone to be newly formed or underdeveloped ones. And here, we are faced with a unique paradox. Manpower forecasting should be used in these underdeveloped countries, but because of rapid and unpredictable rates of change in manpower requirements, and a lack

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35. Halls, W.D., Society, Schools and Progress in France. Oxford: Pergamon Press, 1965, p.57.

of data from which to impute initial trends, it is difficult and sometimes impossible to implement. On the other hand, the well established countries, with more stable rates of change and greater sources of historical data, appear ripe for successful manpower forecasting, but it is just these countries that should be paying more attention to the consumer aspects of education.

Government is allowed to administer the educational system only if the market mechanism would produce an equilibrium mix of occupations that would not be optimal according to the objectives of the country. Accordingly, government must assume the obligation of recognizing the consumer value of education, and incorporate some semblance of equity within its economic planning goals. From the standpoint of national objectives, manpower forecasting should be relegated to a much less important position in the field of planning, and when used, should be done in conjunction with other tools of analysis. But, if efficiency carries any weight whatsoever, manpower forecasting should never be ignored. H.S. Parnes stresses this point:

'so long as one grants that manpower considerations are one of the elements that ought to influence educational decisions, then all such decisions, if they purport to be rational, involve manpower forecasts, whether or not they are explicitly made.' 36/

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36. Parnes, H.S., "Manpower Analysis in Educational Planning" in Planning Education for Economic and Social Development, ed. by Parnes, H.S., EECD, 1963, p.76

An often overlooked drawback of the manpower forecasting approach is that no guarantee is given that any particular forecast mix is 'better' in an efficiency sense, than any other feasible mix. Bereday and Lauwerys are pointing a finger at just this flaw when they say:

'The principal weakness of the manpower-forecasting approach is not the possibility of considerable inaccuracies in forecasting but its failure to pose the problem of supplying requisite manpower between alternatives.' 37/

This problem doesn't arise where the elasticity of demand for a particular skill is truly zero, unless some priority relationship exists among such occupations. However, where substitutability is admissible, and several equivalent sets of forecast requirements are found to be feasible, it is most efficient to select that set which best satisfies an imposed criterion, be it cost minimization or maximization of contribution to future gross national product. Linear programming, non-linear programming and cost benefit analysis, which we shall study shortly, are the most widely used tools in coping with this concept of efficiency. Note however, that in a communistic system of government where factor prices are set by legislative powers, manpower forecasting is not subject to questions of monetary efficiency, since these prices could conceivably be manipulated to make any or all forecast combinations 'most efficient'.

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37. Bereday, G.Z.F., and Lauwerys, J.A., "Section IV: The Cost-Benefit Approach", in The World Year Book of Education-1967. New York: Harcourt, Brace & World, 1967, p.248

Something should be said regarding the implications of efficiency policies on the quality of educational output. Obviously a disproportionately large emphasis on objectives such as cost minimization might lead to pronounced deterioration in this quality. Manpower models do not control the quality of the output, but accept as exogenous parameters and coefficients the curricula and transition constraints designed to control standards. Thus, quality control must also be included as a separate form of analysis, contributing to the findings of the manpower model.

With so many strikes against it, one might wonder why planners persist in using the manpower forecasting approach. Clearly this is because no better substitute has been discovered, and, as S. Moberg says:

'It is of course very easy to object to this simple model, but, as far as I can see, it is better to have a simple hypothesis than no hypothesis at all.' 38/

Thus, we cannot foresee any slackening in the degree of application of manpower tools to planning problems in the future. Indeed, once institutions and governments have established adequate data collection systems (this in itself is a Herculean task), the manpower forecasting approach, along with other modes of analysis, will increase both in scope and reliability.

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38. Moberg, S., "Methods and Techniques for Forecasting Specialized Manpower Requirements", in Forecasting Manpower Needs for the Age of Science. Paris: OEEC, 1960, p.56

### THE COST BENEFIT APPROACH

The cost benefit approach, designed to aid administrators in choosing from among competing resource using alternatives, can best be divided into four steps. First of all, a list should be drawn up of all conceivable ways of achieving a given objective, or performing a given task. Even approaches which at first glance may seem infeasible should not be excluded on a priori grounds. Secondly, decisions must be made as to which costs and benefits are to be evaluated in order to compare the various alternative approaches. Next, and most difficult of all, valuation methods for these costs and benefits must be decided upon. Benefits are usually more troublesome than costs, especially when the more qualitative benefits are under consideration. A particularly sticky decision to be made at this stage is the selection of an interest rate or rates to use in discounting future costs and benefits. Lastly, benefit-cost ratios are computed for each alternative, after which some approaches may be eliminated from further consideration because they are much lower than others. Even further deletions may be made because of exogenous constraints which render them infeasible.

The costs involved in educational cost benefit analysis, labelled 'total factor costs' in the aggregate, are divided into those borne by the student, and those borne by others.<sup>39/</sup>

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39. Schultz, T.W., The Economic Value of Education. New York: Columbia University Press, 1963, p.20.

Costs usually included in the total factor costs are: tuition, other student living costs which would not be incurred by similar non-students; foregone earnings; operating costs such as teacher salaries, administration salaries, maintenance, depreciation and obsolescence expenses, and interest charges. Not included in these costs are peripheral expenses such as lunch and athletic expenses. Scholarships and fellowships are excluded since they are in the form of transfer payments. According to Schultz, there is some controversy as to whether or not tax exemptions are to be included in total factor costs. The general concensus of opinion is that they shouldn't, but Schultz poses this question as one requiring further investigation.<sup>40/</sup>

As was previously mentioned, the main objection to the calculation of costs is that planners are unable to separate costs into investment and consumption components. The usual approach is to estimate all costs and then apply an arbitrary percentage to remove consumption. Though crude, it is the benefit cost ratios in the end that are examined, and hence the relative, not absolute costs are important.

Another criticism usually levelled at the cost side concerns the calculation of foregone earnings.<sup>41/</sup> Since these probably represent the largest portion of the total factor costs

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40. Ibid., p.36

41. Bowman, M.J., op.cit., p.79

(estimated to range from 54% in the United States to 81% in Venezuela), it is imperative that they be estimated correctly.<sup>42/</sup> Data do not exist that would estimate these figures for the student population. The approximation usually taken is to apply the average wages of non-students having the same educational attainment as the students, before the latter decided to continue their education. There is, quite obviously, a downward bias in these estimates, but the magnitude of this deviation is unknown.

Another attack to which the cost benefit approach is exposed concerns the traditional cost valuation method of assigning each year's cost of schooling at its base year cost. Can the criterion of additivity be invoked in such a case? If year A of schooling costs twice as much as year B, does year A contribute twice as much to the stock of human capital as year B? Bowman objects to this base year method for yet another reason:

'Unless interest rates are built into the cost estimates, the real costs of waiting are under-estimated for higher levels of education relative to lower levels.'<sup>43/</sup>

Thus, one of the results of invoking this valuation method is that costs of the lower years of schooling are weighted more heavily than those of the higher years.

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42. Schultz, T.W., The Economic Value of Education. New York: Columbia University Press, 1963, p.29

43. Bowman, M.J., op.cit., p.78

Other less important, though still significant drawbacks exist within the traditional cost calculation structures. It is felt by many people, Bowman being one, that costs of 'drop-outs' overestimate the amount of investment involved. As Bowman says:

'Finally, whether to count as part of formation, the costs of schooling persons who leave school after only a few years?' 44/

The reference here applies to drop-outs in the lower as well as the higher stages of education, since:

'Evidence concerning lapses into illiteracy strongly suggest that two or three years of schooling is almost a total waste when schooling is not continued.' 45/

Thus, many cost biases enter into the calculation of total factor costs.

The benefits involved in educational cost benefit analysis may be separated into the two categories of economic and non-economic benefits. Traditionally, economic benefits are measured in terms of discounted future wage differentials, and the non-economic benefits are noted briefly, but not quantified.

The major criticism of benefit calculations deals with these non-economic benefits. They are usually ignored, as they

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44. Ibid. p.80

45. Ibid. p.83

were by Schultz who hypothesized:

'Assume that all the benefits of schooling are captured by the student.' 46/

Because he invoked such an assumption for expediency of the analysis, Schultz is able to criticize his own work with some comments of B.A. Weisbrod:

'Most economic analysis of return to education has focussed on the contribution of education to earning capacity..... What about those which "increase welfare possibilities directly"?..... What about "resident-related beneficiaries"?' 47/

Benefits naturally accrue to the student in the form of earnings, to the student in the form of consumption, to the student's family, and to many others. All we can imply from a neglect of these non-economic benefits is that the social returns of education are greater than the private returns, but there is much disagreement about the deviation.

Turning to the economic benefits, the desired figure is the total increment to national productivity as a result of all educational increments embodied in the labour force. We wonder whether or not wages are a true measure of productivity. Bowen feels that they are not, citing as his evidence the existence of conspicuous production, tradition bound wage structures, non-monetary job attractions, spill-over benefits

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46. Schultz, T.W., The Economic Value of Education. New York: Columbia University Press, 1963, p.8

47. Ibid. p.56.

such as the free dissemination of innovative techniques, and the influence of collective bargaining on wages, just to name a few.<sup>48/</sup> Anderson and Bowman summarize the situation in the following way:

'It is objected also that market prices, with or without an "incomes policy", are faulty indexes of the productivity of such people as doctors and nurses, and that administered prices (wages, salaries) in a command economy are not measures of productivity for anyone.' 49/

Closely related to the first objection is one dealing with the ability-education correlation. Even if earnings were a good index of productivity, how much of the earnings differentials can be attributed to the increment in education, and how much to other factors? Bowman brings this point to light in her summary of Schultz' approach to the economic value of education:

'However, it runs into trouble because of the difficulties of distinguishing educational factors from other factors associated with education that effect income differentials.'50/

In his treatise on general 'on the job training' and subsequent empirical analyses, Gary Becker attempted to come to grips with this question. He recorded his results as follows:

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48. Bowen, W.G. Economic Aspects of Education: Three Essays. Princeton, N.J., Industrial Relations Section, Princeton University, 1964.

49. Anderson, C.A., and Bowman, M.J., op.cit., p.30

50. Bowman, M.J., op.cit., p-91

'Of this strong correlation between ability and education, how much accounts for a high rate of return? .....Evidence shows that this accounts for only a small part.'51/

Even though this might be acknowledged as the best approach to benefit calculation at present, clearly, many fresh promising approaches are to be welcomed with open arms.

The choice of an appropriate interest rate at which to discount future benefits arouses more differences of opinion. Bowman points out that market forces don't equate costs and expected incomes as in physical capital since yields vary by levels of schooling. In her opinion, the choice of discount rate is arbitrary, and much is to be said for using no rate whatsoever, when computing base-year lifetime earned incomes for Becker's benefit analysis.52/

The only rationale for using a constant rate of interest throughout the discounting procedure is that it simplifies calculations. But this is not a convincing reason.

As a by-product to the cost benefit exercise, the data can be used to crudely measure the rate of return on an investment in a particular form of education. Since non-economic benefits have been excluded, even a mediocre return with respect to private sector investments can imply a much higher one, once these are taken into account. The fact that the generated rates

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51. Becker, G.S., Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education. Princeton, N.J., Princeton University Press, 1964, p.79-87.

52. Bowman, M.J., op.cit, p.75

of return are average figures, and each individual is seeking a marginal result, detracts from the utility of this rate of return analysis. Becker examined the variation in these average rates of return and found them to be extraordinarily large.<sup>53/</sup> It might be noted in passing that this rate of return analysis is only meaningful, and not very much at that, in democratic countries, for as S. Strumlin states:

'In socialist countries, a high profit rate compared with private investment is no yard-stick.' 54/

All in all, the cost benefit approach to educational planning and decision making contains so many unrealistic assumptions, and insurmountable problems, that it would hardly seem worth the effort to spend much time with it. We must remember, though, that the ratio of benefits to costs for each competing alternative contain the same biases. To reiterate, it is the relative size of these ratios that determines which are most favourable. The absolute size is only a crude measure of whether or not the alternative is 'paying for itself'.

Consideration is given to non-quantifiable aspects, such as the consumer aspects of education, after the benefit cost ratios have been calculated. This occurs in the fourth

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53. Becker, G.S., Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education. Princeton, N.J.; Princeton University Press, 1964, p.111.

54. Strumlin, S., "The Economics of Education in the U.S.S.R.", in Economic and Social Aspects of Educational Planning, UNESCO, 1964, p.70

stage of the approach, where all applicable constraints are studied for each alternative. In this way, the difficulties in computing non-economic benefits do not arise.